

The value of the bird collections and associated data in regional museums: *Lanius excubitor* specimens in Šarišské Museum, Bardejov, Slovakia

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Dedicated to the memory of PhMr. Tibor Weisz

SUMMARY

Current ornithology, when working on long-term studies of the ecology and conservation of bird species, faces the problem of how to obtain relevant data. This challenge is particularly acute in the case of rare or uncommon species. The importance of museum collections of all sizes, and aspects of the use of collections for such studies, are the subject of this paper. The Department of Natural History, Šarišské Museum, Bardejov, Slovakia, holds the most extensive collection of Great Grey Shrikes in the world, totalling 665 skin and mount specimens, 600 sterna complexes, 207 ectoparasite samples, 7 endoparasite samples, 132 stomach contents and 9 clutches from north-eastern Slovakia, taken in the period 1956–1983.

Introduction

The Great Grey Shrike *Lanius excubitor*, which has about a quarter of its entire breeding range in Europe, has shown population declines over almost all its European range in recent decades; this trend apparently results from habitat loss through agricultural intensification (Tucker & Heath 1994), and low population densities typify this species in most of Europe (Tryjanowski *et al.* 1999). Obtaining data on long-term trends in the species' population ecology is therefore increasingly problematic. Consequently, most research on the species (e.g. taxonomy, morphology, moult sequences, ecological problems, parasitology) has been based on relatively small sample sizes. Larger datasets are nevertheless available, and occasionally used, for such studies: taxonomy and morphology (Eck 1973, 1990a,b, 1994), ecology and behaviour (Schön 1994a,b), and foraging and nesting biology (Lorek *et al.* 2000).

One solution to the current situation of scarcity of relevant field data is the use of museum collections, where much relevant information awaits a number of novel applications, in spite of the fact that the use of museum collections as an information source is rather uncommon (Remsen 1995). Traditional bird collections generally include study skins, spirit specimens, skeletons, nests, clutches of eggs, frozen tissues, parasites and stomach contents (Mearns & Mearns 1998). Data on locality, date, collector and measurements are generally associated with specimens, although more detailed information, including circumstances of collection, habitat, behaviour, additional measurements, and condition of the bird, are less commonly included on

labels. The importance of maximising information content related to specimens was recently emphasised in the metadata concept in ecology and biology (Michener 1994).

Most museum-based studies have been carried out in large, well-known collections (Peterson *et al.* 1998). Owing to exigencies of time and resources, most researchers focus studies in larger collections rather than regional museums; but we submit that the latter also often hold useful high-quality data. The aim of this paper is to outline uses of series of Great Grey Shrikes in the Šarišské Museum, Bardejov (SMB), Slovakia, which holds what we believe to be the world's largest sample of this species.

Materials and methods

Study area

An important feature of the SMB collection is its orientation toward significant series from a single geographic area. From 1957 to 1983, Great Grey Shrikes were collected in north-eastern Slovakia (49°03'–49°27' N, 20°30'–21°47' E) in the eastern and western Carpathians, in the European temperate zone. This region, centered around Bardejov, is hilly, with elevations from 170 m in the lowest river basins to 1,157 m at the peaks of the Ďergov Mountains.

Owing to its climatic and landscape features, this region mixes Mediterranean (e.g. Bee-eater *Merops orientalis*) and boreal faunistic elements (e.g. Tengmalm's Owl *Aegolius funereus*, Pygmy Owl *Glaucidium passerinum*). Broad valleys running approximately north–south provide corridors for fauna and flora from the warm open plains of the Carpathian Basin and Great Pannonian Lowland. The region is intensively farmed but presents a mosaic of agricultural fields in lower parts, forests along creeks and rivers, and continuous forests on hilltops and mountainsides.

Collector

PhMr. Tibor Weisz (1928–1983), pharmacist, zoologist and phenomenal collector, dealt with many animal groups, as is seen in the diversity of his specimen material. He collected for the Hungarian Natural History Museum, Budapest (specimens destroyed), and the Museum of the University of Forestry and Wood Industry, Košice, Slovakia. He was founder of two natural history museums, in Prešov and Bardejov, both in Slovakia. The natural history collection at Bardejov alone holds about 700,000 specimens, including nearly 6,000 skins of almost 700 bird species, more than 3,500 sterna, approximately 800 clutches of eggs, etc.; Weisz's principal interests were with birds.

Documentation of birds in SMB

The main distinguishing feature of the SMB museum, established in 1956, lies in the way the collections were documented. The data associated with most specimens include much more in the way of measurements and notes than in other museums, including information on length of both wings, condition (general health), size of

gonads, relationships with other individuals (parent, nestling, sibling), and other associated voucher material (sternum, stomach content, ecto- and endoparasites, clutches, nests). An important component of data in the collection consists of detailed notes on all activities of a collector during the day, notes on each collecting event, and often cross-reference between specimens. Weisz was a pioneer of modern ornithological and natural history methods in museum collections in Slovakia and the Czech Republic. However, maybe because he was the only naturalist in the museum for 20 years, and maybe because of his heavy preoccupation in fieldwork, a small part of his collections lack one or more basic items of information, such as locality, sex, etc. Moreover, the collector's personal diaries, which contain detailed descriptions of his daily activities, remain in the possession of his family, and are accessible only with their permission.

Specimen collection

Many local shooters under the direction of Tibor Weisz collected the SMB Great Grey Shrike series. All preparation steps were noted, and all specimens labelled with a unique numeric identifier. Field notes included information on each bird collected, frequently including habitat descriptions, behavioural observations, etc. The birds were collected through the entire year, during single day trips or longer expeditions, using cars or all-terrain vehicles to cover broader areas. The taxidermists were members of a field team, so preparation and data collection were done immediately, or shortly after obtaining the specimens.

Specimen preparation and processing

Specimens were prepared by means of traditional techniques for making study skins. Arsenic was used as a preserving medium. Skilled taxidermists J. Trencsenyi, V. Borùvka, and S. Trenèan were the principal preparators of the SMB bird collection. All measurements were taken by T. Weisz on fresh birds, with body mass sometimes noted by taxidermists. Measurements taken on most or all specimens were body length, lengths of both wings (slightly flattened), lengths of longest and shortest rectrices, tarsus length (measured as the distance between the sole side of the opened foot, abutted on callipers at right angle and measured to the proximal point of the tarsometatarsus), bill length measured to the anterior edge of the nostril and to first feathering, and wing span. Sex was determined through dissection of gonads, and age was noted, as well as description of colouration, wing-bars and other features.

Ectoparasites were collected by T. Weisz or the taxidermists from fresh birds by direct inspection, without using special methods such as fumigation. Parasites were preserved in 75% ethanol. Dissection out of endoparasites, when done, was undertaken directly in the field by J. K. Macko (Parasitological Institute, SAS, Kosice, Slovakia) and his co-workers. Material was preserved in fixative solutions specific to particular helminth groups (e.g. nematodes in Barbagal solution, cestodes in alcohol-formol-acetic acid). Stomach contents were collected and preserved in the course of preparation, and stored in 70% ethanol, sometimes inside the actual stomach.

Sterna were preserved during preparation, and cleared with hydrogen peroxide; complete sternal preparations include the sternum proper, furcula, coracoids and scapulas.

The collection database is built on information recorded at several levels. The collector's first step was to note data in a field notebook. All of the following information resources, such as cards and the database, are based on these notebooks.

Basic evidence on specimen acquisition

The Great Grey Shrike series was established in the course of other research and collecting activities of the Department of Natural History of SMB. Members of the collecting teams report no special preference for this species. We present the spatio-temporal origin of samples on a seasonal and year-to-year basis (Fig. 1, 2). Table 1 outlines the data limitations on the specimen material relating to the sample in SMB.

The collection shows two peaks, i.e. in the early sixties and in the early seventies. This gives an opportunity to stratify data into two groups and still have enough data for statistical treatment, when e.g. splitting the samples around 1970.

Month of collection reveals seasonal variation in sampling. The peak in March doubtless reflects the period with the highest probability of seeing birds. November probably reflects the month in which the birds arrive in their winter territories. Both peaks correspond with times of migration.

TABLE 1
Features of the Great Grey Shrike series in the SMB collection

	N	%
Total number of specimens	665	100
Number lacking date	41	6
Number lacking locality information	57	9
Number not aged	123	18
Number not sexed	146	22
Number with obvious measurement errors	16	2
Number of ectoparasite samples	207	31
Number of endoparasite samples	7	1
Number of stomach contents sampled	132	20
Number of sterna	600	90
Number of egg clutches	9	100
Number of clutches with known paternity	5	56

Taxonomic status of birds in the collection

The area sampled is situated at the southern edge of the continuous geographic breeding range of the Great Grey Shrike. All the birds in SMB are currently identified as *Lanius excubitor excubitor*, the nominate race (T. Weisz in Hudec 1983, Eck 1993, 1994), although several individuals appear to reflect characters of the south-eastern subspecies *L. e. homeyeri*; the question has yet to be examined in detail.

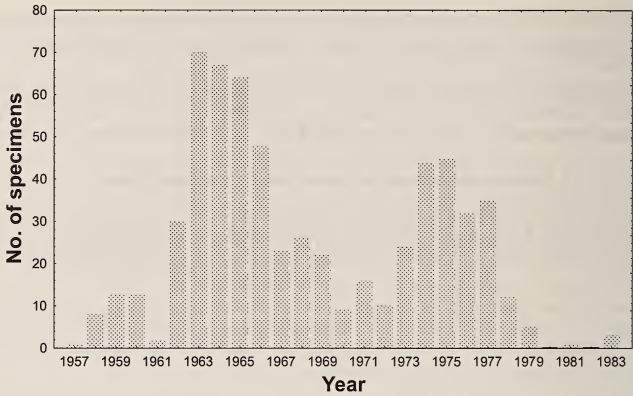


Fig. 1. Annual additions of Great Grey Shrikes to the SMB collection

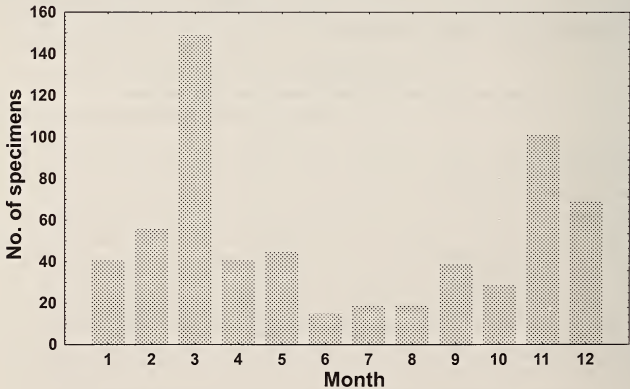


Fig. 2. Specimens of Great Grey Shrikes in SMB, by month of collection

Stomach contents

The 132 stomach content samples contained 608 prey items belonging to 82 animals of 39 families and 17 orders (Hromada & Křiřtín 1996). Only small mammals, and to a lesser degree carabid beetles, were found in food relatively regularly throughout the year. Diversity of food items was highest in May and June, while evenness peaked

in January and February. Hromada & Krištín (1996) discussed the occurrence of necrophagous animals and difficulties with small prey items, as well as methodological difficulties in estimating diets from stomach contents.

Parasites

At the time of collection, the birds were investigated for ectoparasites and a subset also for endoparasites. In current research one secondary was examined to estimate rates of infestation by syringophilid mites living in the feather quill, and a new species, *Syringophiloidus weiszii*, was identified (Skoracki *et al.* 2001). In total, 508 Great Grey Shrikes were examined, of which 18 (3.54%) were infested by quill mites. This low rate is probably due to the solitary nature of the shrikes and thus low dispersal opportunities of these highly specific parasites (Skoracki *et al.* 2002).

Time series

The sample allows us to address temporal issues in two ways: (1) changes across the entire period (26 years), and (2) within-year seasonal changes. An extended time series helps avoid the biases that can plague shorter studies. Data can be integrated with new datasets obtained by non-invasive methods, e.g. from blood, feather and parasite sampling, etc. Temporally extended series can be used to evaluate the effects of increasing human population and environmental damage. Data from the collection enabled us to estimate a minimum density of Great Grey Shrikes in around Bardejov in the 1960s (Krištín & Hromada 2002): breeding density at that time was at least twice as high as it is at present.

Discussion

The role of regional museums is of growing importance at present. In spite of their smaller overall holdings, regional museums often have the advantage of local expertise, ability to respond quickly to local issues and collect significant conservation data. Because collecting localities are often nearby, and staff are usually experts regionally, a main focus is often on local community composition and conservation issues (Davies 1995, 1996). Thus, regional museums should play a crucial role in the long-term collecting related to questions of regional conservation, natural history, species composition, and community change. This focus of local expertise can offer great advantages, particularly when work is developed in connection with major museum collections that can provide expensive analytical capabilities and broader contextual information for local faunas and floras.

The long-term maintenance of systematic collections, including smaller ones, serves the important task of documenting the biodiversity of the earth (Backeljau *et al.* 1995, Goethem *et al.* 1995, Shaffer *et al.* 1998). Use of this information resource for studying diverse aspects of ecology, environmental biology and conservation is relatively uncommon, in spite of the great potential that we have attempted to illustrate

in this paper. Local and regional collections are, however, more vulnerable to loss, given shifts in availability of economic resources and political upheavals.

The best way to realise the potential of these information resources is via co-operation. Indeed, a recent commentary stated: 'We find a picture of what the new natural history museum world should look like: it will be collaborative....' (Apt *et al.* 1997). Networking and participating in internet-based data-sharing projects are one avenue to pursue in this regard (Peterson *et al.* 1998).

The collections of SMB, despite the good use made of the Great Grey Shrike material, are still relatively under-utilised. The principal problem is probably that SMB has not yet issued its catalogue, so the collection remains relatively unknown. Nevertheless, the preliminary results of our analysis of the extensive SMB Great Grey Shrike series indicate exciting opportunities for more advanced studies, e.g. ptilo-chronology, dynamics of infestation by parasites through season and time periods, effect of population dynamics on evolution and genetics, physiological trade-offs, etc.

These examples illustrate the importance of broad-spectrum preservation of information content by collectors. Almost none of the methods we are presently using had been developed in the 1950s, when the SMB series was begun. Generally, most information available can be used in the future in ways not currently appreciated. Although the usual pressures exist for efficiency in work effort, it is impossible to predict what may be useful in future studies (see, e.g., Remsen 1995). Today we are reaping the rewards of the work of our predecessors, the collectors from decades or more in the past, and we have to attempt to be equally shrewd and responsible with respect to those that come after us.

Acknowledgements

We thank the Head of the Natural History Department of SMB, Tomáš Jászay, for his general help. Dana Tulenková prepared the computer database, Ján Kleban helped with working material up, and Dries van Nieuwenhuysen encouraged us to study this fascinating collection. A. Townsend Peterson, Ivica Král'ová and Nigel Collar critically read first versions of the manuscript and made corrections of our English. Visits by M. Antczak, L. Kuczyński, M. Skoracki, and P. Tryjanowski to SMB were supported by a special grant from the Faculty of Biology, Adam Mickiewicz University.

References:

- Apt, J., Brown, E. H., Crane, P., Fri, R. W., Futter, E. V., Goldstein, K. L. & Hager, M. W. 1997. Toward a natural history museum for the 21st Century. *Museum News* (American Association of Museums) 76 (Nov/Dec): 38.
- Backeljau, T., van Goethem, J. & Wouters, K. 1995. New trends in systematics and taxonomy. *Nouvelles de la Sciences et des Technologies* 13: 201-204.
- Davis, P. 1995. Can small museums play a part in conserving biodiversity? *NatHis. Newsletter* (ICOM) 1: 2.
- Davis, P. 1996. Small is still beautiful: provincial museum and biodiversity. *Abstracts of Annual Meeting of the NatHist International Committee, ICOM, 'Saltillo 96'*: 5.
- Eck, S. 1973. Intraspezifische Ausformungen im Flügel- und Schwanzbau bei Würger-Formenkreisen der Gattung *Lanius*. *Zool. Abh. Mus. Tierk. Dresden* 32: 75-119.
- Eck, S. 1990a. Über Maße mitteleuropäischer Sperlingsvögel (*Aves: Passeriformes*). *Zool. Abh. Mus. Tierk. Dresden* 46: 1-55.

- Eck, S. 1990b. Die systematische Stellung von *Lanius excubitor meridionalis* Temminck, 1820 (Aves, Passeriformes: Laniidae). *Zool. Abh. Mus. Tierk. Dresden* 46: 57-62.
- Eck, S. 1994. Über die Formbildung bei den Raubwürger-Arten (*Lanius excubitor* u.a.). *Mitt. Ver. Sächs. Orn.* 7: 265-277.
- van Goethem, J., Wouters, K. & Backeljau, T. 1995. The Royal Belgian Institute of Natural History Sciences and the role of natural history collections in biodiversity research. *Nouvelles de la Sciences et des Technologies* 13: 205-209.
- Hromada, M. & Krištín, A. 1996. Changes in the food of the great grey shrike (*Lanius excubitor*) during the year. *Biologia, Bratislava* 51: 227-233.
- Hudec, K. (ed.) (1983) *Fauna ĚSSR. Ptáci*, 3. Academia Praha, Prague.
- Krištín, A. & Hromada, M. 2002. *Lanius excubitor*. Pp.567-569. In Danko, Š., Darolová, A., Krištín, A. (eds.) *Bird Distribution in Slovakia*. VEDA, Bratislava.
- Lorek, G., Tryjanowski, P. & Lorek, J. 2000. Birds as prey of the Great Grey Shrike (*Lanius excubitor*). *Ring* 22: 37-44.
- Mearns, B. & Mearns, R. 1998. *The bird collectors*. Academic Press, London.
- Michener, W. K., Brunt, J. W., & Stafford, S. G. (eds.) 1994. *Environmental information management and analysis: ecosystem to global scales*. Taylor and Francis, London.
- Peterson, A. T., Navarro-Sigüenza, A. G. & Benítez-Díaz, H. 1998. The need for continued scientific collecting: a geographic analysis of Mexican bird specimens. *Ibis* 140: 288-294.
- Schön, M. 1994a. Kennzeichen des Raubwürgers (*Lanius e. excubitor*) Lebensraumes im Gebiet der südwestlichen Schwäbischen Alb: Jahreszeitliche Nutzung und Revier-Grösse, Strukturmerkmale und Veränderungen, Kleinstrukturen und Bewirtschaftung. *Ökol. Vögel* 16: 253-495.
- Schön, M. 1994b. Brutverhalten und Paarbindung des Raubwürgers (*Lanius e. excubitor*): Paarbildung, Brutverlauf und Familien-Auflösung im Gebiet der Südwestlichen Schwäbischen Alb. *Ökol. Vögel* 16: 81-172.
- Shaffer, H. B., Fisher, R. N. & Davidson, C. 1998. The role of natural history collections in documenting species declines. *Trends in Ecology & Evolution* 13: 27-30.
- Skoracki, M., Hromada, M. & Tryjanowski, P. 2001. Description of a new quill mite *Syringophiloidus weiszi* sp.n. (Acari, Prostigma, Syringophilidae) from great grey shrike *Lanius excubitor*. *Acta Parasitologica* 46: 30-34.
- Skoracki, M., Tryjanowski, P. & Hromada, M. 2002. Two new species of the genus *Syringophilopsis* Kethley, 1970 (Acari: Syringophilidae) parasitizing quills of true shrikes (Aves: Laniidae). *Parasite* 9: 11-16.
- Remsen, J. V. 1995. The importance of continued collecting of bird specimens for ornithology and bird conservation. *Bird Conserv. Internatn.* 5: 145-180.
- Tryjanowski, P., Hromada, M. & Antczak, M. 1999. Breeding habitat selection in the Great Grey Shrike *Lanius excubitor*—the importance of meadows and spring crops. *Acta Orn.* 34: 59-63.
- Tucker, G. M. & Heath, M. F. 1994. *Birds in Europe: their conservation status*. BirdLife International, Cambridge, U.K.

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